CHAPTER 7

DOCKAGE-FREE LENTILS

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7.1 DEFINITIONS

Dockage-Free Lentils. Lentils from which the dockage has been removed.

Lentils. Threshed seeds of the lentil plant (Lens culinaris Moench) which after removal of the dockage contains 50.0 percent or more of whole lentils and not more than 10.0 percent foreign material.

7.2 GRADES AND GRADE REQUIREMENTS

The grades and grade requirements for the class Lentils are shown in the United States Standards for Lentils (section 68.607) and in the Attachment, "Grades and Grade Requirements for Dockage-Free Lentils," to this chapter.

7.3 SPECIAL GRADES AND SPECIAL GRADE REQUIREMENTS

a. The special grade and special grade requirements of the class Lentils are shown in the United States Standards for Lentils (section 68.609).

b. A special grade, when applicable, is supplemental to the grade assigned. Such special grades for lentils are defined as follows:

(1) Large Lentils. Lentils of which not more than 3.0 percent will readily pass through a 15/64-inch round-hole sieve.

(2) Small Lentils. Lentils of which 95 percent or more will readily pass through a 15/64-inch round-hole sieve, not less than 80 percent will readily pass through a 12/64-inch round- hole sieve, and not more than 3.0 percent will readily pass through a 9/64-inch round-hole sieve.

7.4 WORK RECORD

Record the results of all tests and findings clearly and accurately on a laboratory ticket or similar form. This will be used as the source of the information reported on the inspection certificate. FGIS personnel shall use either form FGIS-981, "Pea and Lentil Laboratory Ticket" or form FGIS-982, "Pea and Lentil Sample Ticket." Cooperators shall use a similar form.

7.5 REPRESENTATIVE PORTION

A specified quantity of lentils divided out from the representative sample by means of an FGIS approved device.

7.6 WORK SAMPLE

A representative portion of lentils (approximate size - 1,000 grams) that is used to make all determinations required for the class Lentils.

7.7 FILE SAMPLE

a. A representative portion of lentils (approximate size - 1,000 grams) that may be used in conjunction with the work sample, when needed. File samples may also be used for monitoring, retest, and appeal inspection purposes.

b. Retain file samples in appropriate containers for the required retention period. After maintaining for the required period, dispose of the file samples in accordance with established procedures. See FGIS Directive 9170.13, "Uniform File Sample Retention System," for additional information.

7.8 PERCENTAGES

a. Percentages are determined on the basis of weight and are rounded as follows:

(1) When the figure to be rounded is followed by a figure greater than or equal to 5, round to the next higher figure; e.g., report 6.36 as 6.4, 0.35 as 0.4, and 2.45 as 2.5.

(2) When the figure to be rounded is followed by a figure less than 5, retain the figure; e.g., report 8.34 as 8.3 and 1.22 as 1.2.

b. Record factor results to the nearest tenth percent.

7.9 LABORATORY SCALES

Weigh samples and portions of samples using the proper class of FGIS approved laboratory scales, and record the results to the correct division size. Use the following table to determine the scale class and division size required for weighing particular sized samples.

Table 1 - Laboratory Scales

Position Size	Scale Class	Maximum Division Size	Record Results to at Least the Nearest--
120 grams or less	Precision	0.01 gram	0.01 gram
Samples for moisture determinations	Precision or Moisture	0.1 gram	0.1 gram
More than 120 grams	Precision, Moisture, or General	1 gram	1 gram

NOTE: See Chapter 2 of the Equipment Handbook for additional information.

7.10 PRELIMINARY EXAMINATION

a. The sampler must observe the uniformity of the lentils as to class, quality, and condition; make the determination for "Heating;" draw the representative sample; and report relevant information to the inspector.

b. The inspector must review the sampler's remarks/information. If the inspector has questions or doubts the representativeness of the sample, he or she must contact the sampler and obtain the needed information or make arrangements to obtain another sample.

7.11 BASIS OF DETERMINATION

Color shall be determined after the removal of dockage, defective lentils, and foreign material.

Defects in lentils shall be scored in accordance with the order shown in section 868.601(c). Once an individual lentil is scored in a defective category, it shall not be scored for any other defect, but it shall remain as a part of the sample for purposes of determining the percentage of defects in the sample.

NOTE 1: When lentils that are offered for inspection as one lot are found to contain more than 10,000 containers or 1,000,000 pounds (bulk) of lentils, the lot must be sampled on the basis of two or more (approximately) equal-sized sublots of 10,000 containers or 1,000,000 pounds or less. Inspect each sublot separately.

NOTE 2: When lentils that are offered for inspection as one lot are subsequently found to contain portions that are distinctly different in quality, or condition, the lentils in each portion shall be inspected separately.

Follow a systematic factor examination procedure. The order of procedure may vary depending on the quality of the lentils and the tests that are requested. A general order of procedure is as follows:

(1) Review the information on the sample ticket.

(2) Examine the sample for odor, broken glass, and metal fragments.

(3) Use an FGIS approved divider to process the representative sample into two representative portions: a work sample and a file sample.

NOTE: For specific information on the operation and maintenance of dividers, see Chapter 7 of the Equipment Handbook.

(4) Examine the work sample for infestation.

(5) When necessary, sieve the work sample to determine if the lentils meet the size requirements for "large lentils" or "small lentils."

(6) When needed, divide out a 250-gram portion from the dockage-free portion and determine the percent of moisture.

(7) Divide out another 125-gram portion and determine the percent of defective lentils and foreign material.

(8) After removing the defective lentils and foreign material from the portion, examine the "clean" portion for color.

7.12 INSECT INFESTATION

NOTE: "Weevils" shall include pea weevils, coffee bean weevils, broad nosed grain weevils, rice weevils, granary weevils, maize weevils, and lesser grain borers. "Other live insects" shall include beetles, moths, meal worms, and other insects injurious to stored lentils.

a. Determine infestation on the basis of the work sample as a whole, a representative portion of approximately 125 grams, and the lot as a whole.

(1) Perform a cursory examination of the work sample. If two or more live insects are found, consider the lentils to be "U.S. Sample grade."

(2) Closely examine a representative portion of approximately 125 grams divided out from the work sample.

(a) If no live insects are found in the sample, make no further check of the sample for insects.

(b) If two or more live insects are found, consider the lentils to be "U.S. Sample grade."

(c) If one live insect is found, closely examine the remainder of the work sample.

1 If one or more live insects are found in the remainder of the work sample, consider the lentils to be "U.S. Sample grade."

2 If no live insects are found in the remainder of the work sample, do not consider the lentils to be "U.S. Sample grade."

(3) Examine the lentils in the lot; i.e., the surface area of the lot and the area around the lot.

(a) If no live insects are found in, on, or about the lot, make no further check of the lot for insects.

(b) If two or more live insects are found, consider the lentils to be "U.S. Sample grade."

b. When applicable, show "U.S. Sample grade on account of live insects" on the work record and in the ARemarks@ section of the certificate, and grade the lentils "U.S. Sample grade."

7.13 MOISTURE

Moisture content shall be determined by the use of equipment and procedures set forth in the Equipment Handbook or by any method that gives equivalent results.

a. Upon request or when deemed necessary, determine moisture on a representative portion of exactly 250 grams.

b. Refer to Chapter 5 of the Moisture Handbook for information about determining moisture using the Motomco Moisture Meter.

NOTE: If a representative portion of the original sample of dockage-free lentils was not placed in a moisture-proof container at the time of sampling, promptly do so upon arrival at the laboratory. Seal the container with a friction or screw-top lid to preserve the moisture. The use of open containers, paper containers, and similar containers for holding moisture samples is prohibited.

c. Record the percent of moisture on the work record to the nearest tenth percent. If the moisture results exceed 14.0 percent, grade the lentils "U.S. Sample grade."

7.14 ODOR

a. Determine odor on the basis of the lot as a whole or the representative sample as a whole.

(1) Off-odors (i.e., musty, sour, and commercially objectionable odors) are usually detected at the time of sampling.

(a) If there is any question as to the odor when the sample is being taken, put part of the sample into an airtight container to preserve its condition for further examination in the laboratory.

(b) Return the portion to the sample before other tests are made.

(2) A musty odor shall be any odor that is earthy, moldy, and ground-like. Do not confuse a burlap bag odor with a musty odor.

(3) A sour odor shall be any odor that is rancid, sharp, or acrid.

(4) A commercially objectionable odor shall be any odor that is not normal to lentils and that, because of its presence, renders the lentils unfit for normal commercial usage; e.g., animal hides, fertilizer, oil products, skunk, smoke, fire-burnt, and decaying animal and vegetable matter odors.

(5) Fumigant or insecticide odors are considered commercially objectionable odors if they linger and do not dissipate. When a sample of lentils contains a fumigant or insecticide odor that prohibits a determination as to whether any other odor(s) exists, apply the following guidelines:

(a) Original Inspections. Allow the work portion to aerate in an open container for a period not to exceed 4 hours.

(b) Appeal and Board Appeal Inspections. Allow unworked file samples and new samples to aerate in an open container for a period not to exceed 4 hours. The 4-hour aeration requirement does not apply when the original work portion was aerated and retained as the final file.

(c) Final Action. Consider the sample as having a commercially objectionable odor if the fumigant or insecticide odor persists based on the above criteria.

b. When lentils are determined to be musty, sour, or have a commercially objectionable odor, record the type of odor on the work record and in the ARemarks@ section of the certificate, and grade the lentils "U.S. Sample grade."

7.15 HEATING

a. Determine heating on the basis of the lot as a whole.

(1) When high temperatures develop in lentils as the result of excessive respiration, such lentils are heating.

(2) Heating lentils usually give off a sour or musty odor.

(3) Care should be taken never to confuse lentils that are warm due to storage in bins, cars, or other containers during hot weather with lentils that are heating from excessive respiration.

b. When applicable, show the term "Heating" on the work record and in the ARemarks@ section of the certificate, and grade the lentils "U.S. Sample grade."

7.16 DEFECTIVE LENTILS

The categories of defective lentils shall be weevil-damaged lentils, heat-damaged lentils, damaged lentils, and split lentils.

a. Determine defective lentils on a representative portion of approximately 125 grams.

NOTE: When inspecting small-seeded varieties of lentils, such as Small Browns, determine the percent of defective lentils on a representative portion of approximately 60 grams.

b. Score defects in the following order: Weevil-damaged, heat-damaged, damaged, and split lentils.

(1) Once an individual lentil is scored, do not score it for any other defect but retain it as part of the sample for purposes of determining the percentage of other

defects in the sample.

(2) Record the percent of each type of defect and the percent of total defects on the work record and the certificate to the nearest tenth percent. (If an individual factor result is 0.0 percent, no result is required to be shown.)

7.17 WEEVIL-DAMAGED LENTILS

Weevil-Damaged Lentils. Whole and pieces of lentils which are distinctly damaged by weevils or other insects.

a. Determine weevil-damaged lentils on a representative portion of approximately 125 grams.

NOTE: When inspecting small-seeded varieties of lentils, such as Small Browns, determine the percent of weevil-damaged lentils on a representative portion of approximately 60 grams.

b. Consider as weevil-damaged:

(1) Lentils that contain or had contained a weevil, larva, or any other insect; and

(2) Lentils that have been stung by weevils or other insects where the damage extends into the cotyledon and is of a size equal to or greater than that shown on ILS - Lentil 1.0.

NOTE: Lentils that have been "marked" by insects but where the sting does not penetrate the cotyledon are not considered as weevil-damaged lentils.

c. Record the percent of weevil-damaged lentils on the work record and the certificate to the nearest tenth percent.

7.18 HEAT-DAMAGED LENTILS

Heat-Damaged Lentils. Whole and pieces of lentils which have been materially discolored as a result of heating.

a. Determine heat-damaged lentils on a representative portion of approximately 125 grams.

NOTE: When inspecting small-seeded varieties of lentils, such as Small Browns, determine the percent of heat-damaged lentils on a representative portion of approximately 60 grams.

b. Lentils which have been materially damaged to an extent that the cotyledon has been discolored equal to or greater than that shown on ILS - Lentil 1.3 A (Seedcoat On) or 1.3 B (Seedcoat Removed).

c. Record the percent of heat-damaged lentils on the work record and the certificate to the nearest tenth percent.

7.19 DAMAGED LENTILS

Damaged Lentils. Whole and pieces of lentils which are distinctly damaged by frost, weather, disease, heat (other than to a material extent), or other causes, except weevil or material heat damage or are distinctly soiled or stained by nightshade, dirt, or toxic material.

a. Determine damaged lentils on a representative portion of approximately 125 grams.

NOTE: When inspecting small-seeded varieties of lentils, such as Small Browns, determine the percent of damaged lentils on a representative portion of approximately 60 grams.

(1) Frost Damaged Lentils. Lentils that have been damaged by frost to the extent that the cotyledon or seedcoat has been discolored equal to or greater than that shown on ILS - Lentils 1.2. Frost damaged lentils are usually characterized by a waxy textured cotyledon that may be yellow, green, or another color. Frost damaged lentils should not be confused with immature lentils or lentils that have naturally green-colored cotyledons.

(2) Insect-Stung Lentils. Lentils that have white "chalky" spots usually caused by Lygus bugs or similar insects. (See ILS - Lentils 1.0.)

(3) Mold Damaged Lentils. Lentils which contain surface mold equal to or greater than that shown on ILS - Lentil 1.5. (Lentils which contain any amount of mold on the cotyledon shall be considered to be damaged.)

(4) Damaged-By-Heat Lentils. Lentils which have been damaged by heat to the extent that the cotyledon has been discolored equal to or greater than that shown on ILS - Lentil 1.4 A (Seedcoat On) or 1.4 B (Seedcoat Removed).

(5) Sprout Damaged Lentils. Lentils which are sprouted and the sprout is equal to or greater than that shown on ILS - Lentil 1.6.

(6) Dirt and Grime Damaged Lentils. Lentils with dirt and grime (including nightshade juice) adhering to the seedcoat equal to or greater than that shown on ILS - Peas 1.1.

(7) Worm-Eaten or Worm-Cut Lentils. Lentils which have been chewed by insect larvae. Not to be confused with weevil-bored lentils containing insect webbing or filth. Any chewed lentil is considered damaged.

b. Record the percent of damaged lentils on the work record and the certificate to the nearest tenth percent.

7.20 SKINNED LENTILS

Skinned Lentils. Lentils from which three-fourths or more of the seedcoat has been removed.

a. Determine skinned lentils on a representative portion of approximately 125 grams.

NOTE: When inspecting small-seeded varieties of lentils, such as Small Browns, determine the percent of skinned lentils on a representative portion of approximately 60 grams.

b. Skinned lentils shall be lentils that are scraped or skinned to an extent equal to or greater than that shown on ILS - Lentil 1.7.

c. Record the percent of skinned lentils on the work record and the certificate to the nearest tenth percent.

7.21 SPLIT LENTILS

Split Lentils. Pieces of lentils which are less than three-fourths of a whole lentil, and lentils in which the cotyledons are loosely held together.

a. Determine split lentils on a representative portion of approximately 125 grams.

NOTE: When inspecting small-seeded varieties of lentils, such as Small Browns, determine the percent of split lentils on a representative portion of approximately 60 grams.

b. Record the percent of split lentils on the work record and the certificate to the nearest tenth percent.

7.22 FOREIGN MATERIAL

Foreign Material. All matter other than lentils, including detached seedcoats, which cannot be readily removed in the proper determination of dockage.

Stones. Concreted earthy or mineral matter, and other substances of similar hardness that do not readily disintegrate in water.

a. Determine foreign material on a representative portion of approximately 125 grams.

NOTE: When inspecting small-seeded varieties of lentils, such as Small Browns, determine the percent of foreign material on a representative portion of approximately 60 grams.

b. Record the percent of foreign material on the work record and the certificate to the nearest tenth percent.

7.23 INCONSPICUOUS ADMIXTURE

Inconspicuous Admixture. Any seed which is difficult to distinguish from a lentil; including, but not limited to, Vicia sativa.

a. Determine inconspicuous admixture on a representative portion of approximately 125 grams.

NOTE: When inspecting small-seeded varieties of lentils, such as Small Browns, determine the percent of inconspicuous admixture on a representative portion of approximately 60 grams.

b. Record the percent of inconspicuous admixture on the work record and the certificate to the nearest tenth percent.

7.24 SIZE REQUIREMENTS

Large Lentils. Lentils of the class Lentils of which not more than 3.0 percent of the lentils will readily pass through the 15/64-inch round-hole sieve.

Small Lentils. Lentils of the class Lentils of which 95 percent or more will readily pass through a 15/64-inch round-hole sieve, not less than 80 percent will readily pass through a 12/64-inch round-hole sieve, and not more than 3.0 percent will readily pass through the 9/64-inch round-hole sieve.

a. Determine the special grades "Large Lentils" and "Small Lentils" on a representative portion of approximately 125 grams.

(1) Size lentils by sieving the representative portion with the appropriate size sieve (see table 2).

Table 2 - Prescribed Sieves

Special Grade	Sieves
Large Lentils	15/64 - inch Round-Hole
Small Lentils	15/64 - inch Round-Hole 12/64 - inch Round-Hole 9/64 - inch Round-Hole

(2) Nest the appropriate size sieve(s) on top of a bottom pan.

(3) Place the sieve(s) in a mechanical grain sizer and set the timer to 20.

(4) Put the representative portion in the center of the sieve and actuate the sizer.

NOTE: If a mechanical sizer is unavailable, hold the sieves and bottom pan level and, using a steady motion, move the sieves from right to left approximately 10 inches, and return from left to right to complete one sieving operation. Repeat this operation twenty times.

(5) Return the lentils remaining in the perforations of the sieve to the portion that remains on top of the sieve.

(6) Determine the percent of lentils that pass through the sieve(s).

b. Record the percent of lentils that pass through the sieve(s) and the size of sieve(s) used in the determination on the work record.

(1) If not more than 3.0 percent of the lentils pass through a 15/64-inch round-hole sieve, show the special grade "Large Lentils" on the work record and on the grade line of the certificate.

(2) If 95 percent or more of the lentils pass through a 15/64-inch round-hole sieve, not less than 80 percent pass through a 12/64-inch round-hole sieve and not more than 3.0 percent pass through a 9/64-inch round-hole sieve, show the

special grade "Small Lentils" on the work record and on the grade line of the certificate.

7.25 COLOR

Good Color Lentils. Lentils that in mass are practically free from discoloration and have the natural color and appearance characteristics of the predominating class.

Fair Color Lentils. Lentils that are not of good color.

a. Determine color on a representative portion of approximately 125 grams after the removal of dockage, defective lentils, and foreign material.

(1) Lentils shall be considered as "fair color" if they are not of a good natural color or are stained to an extent that seriously affect the appearance of the lot.

(2) Lentils that are discolored by dust or a slight amount of dirt, which can be removed by processing methods, shall not be considered as "fair color."

NOTE: One of the most common causes of discoloration of lentils is excessive heat, so-called "sunburned lentils" which are characterized by dark brown or reddish casts. Long storage may also produce discoloration and prevent the lentils from being considered of good color.

b. When dockage-free lentils are determined to be other than "good color," record this information on the work record and in the ARemarks@ section of the certificate. Lentils that are "fair" in color shall not be graded U.S. No. 1.

7.26 BROKEN GLASS

a. Determine broken glass on the basis of the lot as a whole and/or the representative sample as a whole.

b. The presence of any broken glass (regardless of the size or amount) in the lot as a whole, work sample, or sample as a whole, shall be sufficient evidence of glass.

c. When applicable, show the term "Broken glass" on the work record and in the ARemarks@ section of the certificate, and grade the lentils "U.S. Sample grade."

7.27 METAL FRAGMENTS

a. Determine metal fragments, such as metal filings or metal shavings, on the basis of the lot as a whole and/or the representative sample as a whole.

b. Sufficient evidence of metal fragments shall be:

(1) Two or more metal fragments in the lot as a whole or the work sample; or

(2) One metal fragment in the work sample and one or more in the file sample.

c. When applicable, show the term "Metal fragments" on the work record and in the ARemarks@ section of the certificate, and grade the lentils "U.S. Sample grade."

7.28 DISTINCTLY LOW QUALITY

Distinctly Low Quality. Whole lentils which are obviously of inferior quality because they are stained by an unknown foreign substance or because they otherwise contain a known toxic substance(s) or an unknown foreign substance(s) or because they are in an unusual state or condition, and which cannot be graded by use of the other grading factors provided in the standards.

a. Determine distinctly low quality on the basis of the sample as a whole.

b. Lentils that are obviously affected by unusual conditions which adversely affect the quality of the lentils, such as animal excreta or other filth, two or more pieces of an unknown foreign substance, or treatment with a fungicide, shall be considered to be "distinctly low quality."

c. When applicable, show the statement "Distinctly low quality on account of (cause or reason)." on the work record and in the ARemarks@ section of the certificate, and grade the lentils "U.S. Sample grade."

7.29 INTERPRETIVE LINE SLIDES

The interpretive line slides (ILS) system assists inspectors in making subjective grading decisions. This system consists of a portable tabletop transparency viewer and photographic slide transparencies. The viewer uses a precisely controlled light source of low intensity designed to provide a standard picture and to protect the slide. Therefore, only use the special viewer for ILS. Other light sources, such as a regular slide projector, may provide a distorted picture and damage the ILS. Use of such a projector is not prohibited; but, once used in this manner, the slides may not be used for official purposes.

Table 3
Currently Available Interpretive Line Slides

LENTILS 1.0	DAMAGE - INSECT STUNG
PEAS 1.1	DAMAGE - DIRT AND GRIME
LENTILS 1.2	DAMAGE - FROST
LENTILS 1.3-A	HEAT DAMAGE - SEEDCOAT ON
LENTILS 1.3-B	HEAT DAMAGE - SEEDCOAT REMOVED
LENTILS 1.4-A	DAMAGED-BY-HEAT - SEEDCOAT ON
LENTILS 1.4-B	DAMAGED-BY-HEAT - SEEDCOAT REMOVED
LENTILS 1.5	DAMAGE - MOLD
LENTILS 1.6	DAMAGE - SPROUT
LENTILS 1.7	SKINNED

PAGE RESERVED

Attachment
PEA AND LENTIL HANDBOOK
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GRADES, GRADE REQUIREMENTS, AND GRADE DESIGNATIONS

Grading Factors	Maximum percent limits of: Grades U.S. Nos.		
	1	2	3
Defective Lentils			
Total	2.0	3.5	5.0
Weevil-Damaged Lentils	0.3	0.8	0.8
Heat-Damaged Lentils	0.2	0.5	1.0
Foreign Material			
Total	0.2	0.5	0.5
Stones	0.1	0.2	0.2
Skinned Lentils	4.0	7.0	10.0
Inconspicuous Admixture	0.5	0.8	1.0
Minimum Requirements for Color	Good	Fair	Fair

U.S. Sample grade: U.S. Sample grade shall be lentils which -

(a) Do not meet the requirements for the grades U.S. Nos. 1, 2, or 3; or

(b) Contain more than 14.0 percent moisture, live weevils, or other live insects, metal fragments, broken glass, or a commercially objectionable odor; or

(c) Are materially weathered, heating, or distinctly low quality.